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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/002,676	10/31/2001	Linda Braly	LAM2P298	4626

25920 7590 03/29/2006

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EXAMINER

AHMED, SHAMIM

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 03/29/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/002,676

Applicant(s)

BRALY ET AL.

Examiner

Shamim Ahmed

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– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 January 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 1/9/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Allowable Subject Matter

1. Applicant is advised that the Notice of Allowance mailed is vacated. If the issue fee has already been paid, applicant may request a refund or request that the fee be credited to a deposit account. However, applicant may wait until the application is either found allowable or held abandoned. If allowed, upon receipt of a new Notice of Allowance, applicant may request that the previously submitted issue fee be applied. If abandoned, applicant may request refund or credit to a specified Deposit Account.
2. The indicated allowability of claims 1-24 are withdrawn in view of the newly discovered reference(s) to Lill et al (USP 6,284,665) and Pau et al (6,635,573).
Rejections based on the newly cited reference(s) follow.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
4. Claims 1-24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
5. Regarding all the independent claims 1, 11 and 18, step e), the phrase "the etching of the conductive layer being configured to trigger an end point just before all of the conductive material is removed from over the dielectric layer" renders the claim

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indefinite because it is unclear how the endpoint is detected just before removing all of the conductive material.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

7. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by Lill et al (6,284,665).

Lill et al disclose a process for controlling the shape of an etched feature including the steps of etching a silicon substrate to form a trench (3) using a hard mask (8) of silicon nitride (col.11, lines 1-19 and 51-62);

Forming a dielectric layer (10) of silicon oxide over the hard mask and applying a conductive layer of polysilicon (12) over the dielectric layer in order to fill the trench (col.11, lines 64-col.12, lines 1- 3 and lines 14-17);

Lill et al teach etching teach that the conductive layer is etch back in two steps process including the first step until all the conductive layer is removed that overlies the dielectric layer that overlies the hard mask layer, which reads on the claimed limitation “the etching of the conductive material being configured to trigger an end point just

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before all of the conductive material is removed over the dielectric layer" (col.12, lines 28-32 and figures 5-6a).

Lill et al also teach that after the exposure of the hard mask layer, the remaining conductive layer (polysilicon) is removed from the trench area to form a predetermined depth (B), which resembles the claimed recess etching (col.12, lines 32-39 and figure 6b).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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10. Claims 2-7 and 10-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lill et al (6,284,665) in view of Pau et al (6,635,573).

Lill et al discusses above in the paragraph 7 but fail to explicitly teach triggering an endpoint before removing all the conductive material over the dielectric layer that overlies the hard mask using interferometry monitoring.

However, Pau et al teach a process of monitoring a polysilicon etch back with underlying oxide layer from a polysilicon filled trench including the step of monitoring the etch back using interferometry endpoint monitoring technique for efficiently monitoring the etching process (col.2, lines 34-39).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to combine Pau et al's teaching into Lill et al's etching process for efficiently monitoring the etch back process as taught by Pau et al.

As to claims 2 and 11 repeating operations would have been obvious to skilled in the art for achieving desired etched thickness of the material.

11. Claims 8-9,16 and 18-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lill et al (6,284,665) in view of Pau et al (6,635,573) as applied to claims 2-7 and 10-15 above, and further in view of Yang et al.

Lill et al discusses above in the paragraph 10 but fail to teach the recess etching of the conductive layer is performed with a gas chemistry including Ar and SF₆.

However, Yang et al teach polisilicon etchback of a polysilicon filled trench is preferably performed using a gas chemistry Ar and SF₆ (col.5, lines 40-49).

Therefore, it would have been obvious to one of ordinary skilled in the art at the time of claimed invention to employ Yang et al's teaching into modified Lill et al's teaching for efficiently etching the conductive layer such as polysilicon with desired etched profile as taught by Yang et al.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Grimbergen et al (6,081,334) teach conventional endpoint detection using optical interferometry.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shamim Ahmed whose telephone number is (571) 272-1457. The examiner can normally be reached on M-Thu (7:00-5:30) Every Friday Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine G. Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Shamim Ahmed
Primary Examiner
Art Unit 1765

SA
March 22, 2006